IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re application of: Choi et al.

Application No.: 10/798,456

Filed: March 10, 2004

Title: LINE EDGE ROUGHNESS CONTROL

Attorney Docket No.: LAM1P187/P1216

Examiner: Umez Eronini, Lynette T.

Group: 1765

Confirmation No.: 6110

CERTIFICATE OF FACSIMILE TRANSMISSION
I hereby certify that this correspondence is being transmitted by facsimile to fax number 571-273-8300 to the U.S. Patent and Trademark Office on September 28, 2006.

Signed: _____
Agnes Spence

PRE-APPEAL BRIEF REQUEST FOR REVIEW

Mail Stop AF
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Dear Sir:

Applicant requests review of the final rejection in the above-identified application. No amendments are being filed with this request.

This request is being filed with a Notice of Appeal.

The review is requested for the reasons stated below.

On March 10, 2006, a first Office Action was issued by the Patent and Trademark Office rejecting the application for, among other reasons, being unpatentable under 35 U.S.C. § 103. Specifically, claims 1, 2, 4-7, 13, 14, and 18-20 were rejected under 35 U.S.C. 103(a) as being allegedly unpatentable over Naeem et al. (US 5,846,884) in view of Hineman et al. (US 6,379,872 B1), claims 3 and 12 were rejected under 35 U.S.C. 103(a) as being allegedly unpatentable over Naeem et al. (US 5,846,884) in view of Hineman et al. (US 6,379,872 B1),

and further in view of Chen et al. (US 6,080,662), and claims 8 and 10 were rejected under 35 U.S.C. 103(a) over Naeem et al. (US 5,846,884) in view of Hineman et al. (US 6,379,872 B1) and further in view of Angelopoulos et al. (US 6,316,167 B1).

In response to this rejection, on June 9, 2006, the Applicant submitted an amendment with detailed arguments as to why these rejections were incorrect. Additionally, new claims 21-26 were added.

In a Final Office Action mailed August 24, 2006, the PTO indicated that "Applicant's arguments with respect to claims 1-5, 8-15, and 18-26 have been considered but are moot in view of the new ground(s) of rejection because the former prior art of record failed to address 'A method for etching --an inorganic dielectric -- layer . . .' as recited in (Currently Amended) Claims 1 and 18 and the limitations in (New) Claims 21-26." The body of the Final Office Action, however, fails to recite any new ground of rejection of the claims, with the exception of the rejection of the new claims 21-26. Rather, the Final Office Action merely repeats the exact same rejections using the exact same prior art, simply substituting the amended claims in for the original claims, without addressing the arguments made in the amendment or even identifying where in the (old) prior art the newly added elements can be allegedly found. The Patent Office apparently has simply cut and pasted the newly amended claims into the old rejection without seriously considering the arguments.

Applicant respectfully points out that such actions do not constitute a new ground of rejection. Furthermore, Applicant respectfully submits that the arguments made in the amendment are not moot. The arguments address why the cited prior art does not teach or suggest various elements of the claims. Since the Patent Office utilizes the same prior art in the Final Office Action as in the First Office Action, the arguments obviously apply equally in both.

Specifically, Neither Naeem nor Hineman nor their combination teach or suggest "a method for etching an inorganic dielectric layer" or "etching the inorganic dielectric layer" as stated in claim 1 as amended or "placing an inorganic dielectric layer to be etched over a substrate" or "etching the inorganic dielectric layer to be etched with the etch plasma" as stated in claim 18 as amended. Specifically, Naemm describes altering the sputter in the etch from a high sputter to a low sputter prior to the metallization layer being penetrated. Col. 7, lines 4-20. Naemm's concern is the prevention of a high sputter during etching of the metallization layer.

Essentially, Naemm wishes to protect the metallization layer from the etch that penetrates the ARC layer. Naemm does not teach or suggest trying to protect an inorganic dielectric layer during the etch that penetrates the ARC layer, or any other etch for that matter, despite Naemm clearly teaching a dielectric layer (see FIG. 1B). The presently claimed invention, on the other hand, describes a method for etching an inorganic dielectric layer, which is a process that does not occur in Naemm until long after the inventive process in Naemm is completed. The presently claimed invention acts to protect the dielectric layer, which as described above Naemm is indifferent about.

Hineman teaches halting a first plasma etch process prior to completion of the ARC etch. Hineman accomplishes this, however, by using a pre-selected duration or through the use of a detector that detects when etching of the layer beneath the ARC occurs (see Col. 3, line 56 through Col. 4, line 7). Hineman does not attempt to utilize specialized gases, pressures, or other chamber settings to help reduce or eliminate the erosion of the substrate during the first plasma etch.

As such, Applicant respectfully submits that claims 1 and 18 are in condition for allowance.

Additionally, as was pointed out in the amendment, the Office Action does not provide a basis for rejecting claim 15. As such, Applicant is unclear whether this was merely an oversight or whether the claim is in allowable form.

Nevertheless, as to dependent claims 2-5, 8-15 and 19-26, these claims are also patentably distinct from the cited references for at least the same reasons as those recited above for the independent claims, upon which they ultimately depend. These dependent claims recite additional limitations that further distinguish these dependent claims from the cited references.

For example, claim 21 indicates that the substrate sits atop a lower electrode providing power of 0-1000 Watts at 27 MHz and 100-1000 Watts at 2 MHz. The references fail to teach this limitation.

Additionally, claim 22 indicates that the temperature within the chamber is between -20 degree and 40 degrees C. The references fail to teach this limitation. Neither Naeem nor

Hineman teach or suggest "setting the pressure within said processing chamber at between 200 and 300 mTorr" as claimed in claims 1 and 18 as amended. This pressure range helps to inhibit the ARC open plasma from etching the substrate.

Furthermore, as to claims 25-26, a specific chamber pressure range (200 to 300 mTorr) is provided. In Naeem, there are several layers between the ARC layer and the substrate, specifically, referring to FIG. 1, a bottom barrier 104, a metallization layer 106, a first top barrier 108, and a second top barrier 110. The problem in Naemm is not damage caused to the substrate itself, but the difficulty in cleaning the sidewalls that are covered in portions of the inorganic material from the substrate and/or metallization layer. Naeem's solution is to increase the sputter when breaking through the organic ARC layer 112, essentially intentionally causing organic materials to spray on the sidewalls. By doing so, when the eventual inorganic material winds up hitting the sidewalls, it is much easier to remove (see Col. 6, lines 14-32). Notably, the pressure range for the break-through stage is provided in Table 1, and even the broadest range (2-10 mTorr) falls outside the 200 to 300 mTorr range of claims 25-26.

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Additionally, the combination of Naeem and Hineman would still suffer from the drawback of substrate etching during an ARC etch. The pressure range of claims 1 and 18 as amended aids to reduce or eliminate such etching even if the ARC etch is not stopped in time. Both Naemm and Hineman contain no such safety precautions if the ARC etch is not stopped in time and thus their combination would also suffer from such a significant drawback.

Since the PTO has failed to address these arguments in the Final Office Action, Applicant is unable to determined whether they have actually been considered. In light of the same prior art being used to reject the same claims, it seems clear that these arguments are relevant to the rejections in the Final Office Action and should have been addressed in the Final Office Action.

Nevertheless, Applicant respectfully submits that the claims are allowable for the reasons stated above.

I am the attorney or agent acting under 37 CFR 1.34

Respectfully submitted,
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